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Meanings of music in film from a cognitive perspective

ABSTRACT: Cognitive psychology, with its focus on mind and its processes, is one of the approaches to study film music. Although music alone is said to be already meaningful, it gains and transfers specific meanings in the film context. This article aims to contribute to understanding of what film music means and how these meanings are processed in the cross-modal perception of a film. A review of the selected empirical research on film music with regard to meaning is followed by a short overview of the Annabel J. Cohen's Congruence-Association Model (CAM) of media cognition. The model provides a framework for the experiments' results and encourages future interdisciplinary studies in this area.

KEYWORDS: film music, soundtrack, meaning, perception, cognition, cognitive psychology

What does film music mean?

With its ability to evoke strong human responses, music plays a crucial role in the appreciation of cinema. Although it often does not belong to the world in which the narrative takes place (so called diegesis), it draws us into the diegetic realm, engages us in the story and guides us through the plot. Through a multimodal interplay with image, speech and sound effects, music constantly supplies narrative meanings and helps audiences make sense of information provided by the film's representation. After more than a century of absorbing film culture, cinemagoers got accustomed to the specific use of music within films. They became aware of diverse strategies, stereotypes and conventions, oftentimes developed within a given genre and reinforced by subsequent generations of composers. While watching a movie, we trust music to direct our attention, set the expectations and provide us with different types of cues, especially those which help us understand the overall meaning of a story.

One could ask what types of meanings can be communicated by music in the course of a film. Affective and emotional meanings, embodied within the structure of music itself, are the most obvious examples. Music can influence the

affective content of a sequence by imposing its emotional characteristics, which stems from specific relations between such elements like pitch, timbre, texture, volume, duration, or form. Moreover, music can elicit referential meanings, be they connotative or denotative, which are arbitrarily tied to human experiences. They are determined by cultural, social, and historical situations, and are built on references to the external world, like concepts, actions, or situations. Mendelssohn's *Wedding March*, which evokes a vivid image of a wedding, is a prime illustration. Also, we have the idea of what different genres (classical, jazz, pop, etc.) or categories (romantic, battle, storm, etc.) of music should sound like based on the types of instrumentation, rhythm, melody, and harmony. Furthermore, music can gain specific meaning in conjunction with the moving images. For example, a musical theme might become associated with a character, a place, or a situation, operating similar to Wagnerian leitmotifs. These associative meanings of film music facilitate our understanding of a narrative as well as support the emotional dimension of a story. What is even more significant, all these often happen below our conscious level of awareness.

Music is often said to be 'unheard' by moviegoers (Gorbman, 1987). One of the many reasons for this is the supremacy of vision over hearing which is rooted deep in the history of the medium. We go to 'see' a movie or 'watch' a film, however, what we really do is 'watch' and 'listen' simultaneously. Nevertheless, while watching a film we tend to listen passively rather than actively and therefore we process music on a subliminal level. Music functions as an 'inaudible' vehicle that transports different types of information. Being compared to the 'acoustic font', it conveys meaning while its acoustic properties stay transparent to the recipients – similar to a text font, which does not attract attention or affect the content of the message as long as it is legible (Cohen 2000, p. 366). Music and visual images blend together as a movie unfolds, complementing each other in the type of information each represents. Different combinations of these two components lead to different meanings recognised by audiences. Thus the question arises, how meanings communicated by music work in the film context. In other words, what music means in film.

Cognitive approach to film music meaning

One of the approaches to address this question is cognitive psychology, with its focus on mental processing of visual and auditory information within the audiovisual framework. Cognitive psychologists assume that there are certain brain mechanisms responsible for the way we process multisensory stimuli. To explain the mechanisms by which meanings are communicated, those involved in film music studies seek to understand complex principles of music perception and cognition as part of the audiovisual whole. Studying music alone is a challenging task for cognitive scientists, not to mention film as an audio-visual entity. As Annabel J. Cohen put it, 'cinema is a multisensory stimulus that, millisecond by millisecond, impinges on sensory receptors and excites networks of neuronal activity in the mind of every film spectator' (Cohen, 2000, p. 360). To

approach this phenomenon holistically, researchers first have to look at the single parameters and examine their relations in the multimodal context.

The methodology of cognitive psychology is built upon controlled experiments involving human participants. Different research hypothesis are supported, refuted or validated based on gathered information related to how the human mind processes inputs from the outside world. Imagine the input being a short audiovisual material. In the language of cognitive psychology, it is a multidimensional stimulus composed of a great many variables that are interlinked and influence each other inherently (Tan, 2016, p. 24). Oftentimes, it is extremely difficult for the researchers to isolate these variables and design a valid experiment in order to explore their interconnection. In general, the core of every psychological experiment is to examine the influence of the independent variable (music) on the dependent variable (film) and its effect on the research subjects. Such studies provide insight into cause-and-effect by demonstrating what outcome occurs when a particular factor – in this case an auditory stimulus – is manipulated. The majority of such research in audiovisual perception is regarded as highly reductionist, although one has to remember that they tackle a very complex matter.

In most experiments devoted to studying film music, researchers try to conceal that the focus is on music as it is not in the centre of viewers' attention in real-world contexts. As a common practice, a pilot test is first conducted on preliminary group of participants to confirm the valence of selected film and music materials. To measure attitudes or feelings of the respondents, the researchers usually employ the semantic differential scale technique, which involves ratings on bipolar adjective pairs representing three dimensions of affective meaning: evaluative, potency, and activity (Osgood, Suci & Tannenbaum, 1957). This technique is also applied in the main part of the experiments, next to other rating scales and open-ended questionnaires. To determine the results, researchers use, among others, multidimensional scaling, analysis of variance, regression, and factor analysis. The subjects of the experiments are recruited mainly from university students, both musically trained or without any musical background, although some research also engages broader variety of participants.

Most film music experiments to date concentrate on background music which is called *non-diegetic* or *underscore* as distinct from *diegetic* or *source* music. It does not belong to the world depicted in the film and cannot be heard by its characters, but plays a significant role in our understanding of the narrative. The majority of the experiments employ the 'switch-the-music-track' method, introduced in the earliest film music studies and still frequently used and valued. It consists in presenting a given visual clip with music tracks that vary from one another in terms of tonality, tempo, instrumentation, harmonic scheme etc. Music samples range from very simple materials composed by the researchers, through music written specifically for the studies by film music composers, to commercially available excerpts from open music libraries or databases and fragments of original film scores. The latter are usually presented without any additional auditory elements like dialogs or sound effects to avoid unwanted cues. The scope of visual materials is also wide: from simple, computer-generated animations,

through video materials, to selections from actual feature films. Their length may differ from several dozen seconds to several minutes.

Empirical research on audiovisual meaning

The early empirical research on the meaning of music in audiovisual context can be traced back to the late 1980s. The researchers used a simple animation of geometric figures paired with two different musical excerpts or no soundtrack at all to examine how music affects the meaning of a short film (Marshall & Cohen, 1988). They choose a 2-minute abstract animation of Heider and Simmel (1944), presenting a large and small triangle and a small circle, which movements elicit specific attributions of personality. In the main experiment, the animation was synchronised with two piano scores – defined as weak or strong – composed by one of the experimenters. Respondents rated the materials on the semantic differential scale in five conditions: Weak Score-Film, Strong Score-Film, Film Only, Weak Score Only, Strong Score Only. It occurred that through perceived temporal congruence between music and the film, musical accompaniment can direct attention towards a given character in the animation and influence its interpretation by providing specific connotations. For example, a temporal congruence between strong and active melody and the motion of the small triangle drew attention to this figure and the characteristics of music were attributed to it by association. Thus, this pioneering experiment proved that music can alter meaning of a particular aspect of the film, and paved the way for more complex studies.

To give yet another basic example, Cohen (1990, 1993) used a very simple, computer-generated visual display of a ball bouncing with different height and speed, correlated with sounds that varied in pitch (major and minor triad) and tempo. She studied the ratings of affective meaning (sad/happy) of individual modalities independently and in conjunction. It appeared that auditory parameters systematically affected the meaning of the visual modality when presented together. For example, high fast bounces seemed significantly less happy when paired with a slow melody in a low register based on minor triad. This study suggested that the final meaning of a given display is additive, which means that it consists of meanings elicited by different visual and auditory components. Similar effects were observed by Sirius and Clarke (1994), who showed that background music can change the meaning of a simple computer-generated animation of moving geometric figures and that the effects of music on the ratings of visual materials are essentially additive.

In the described studies, the researchers were examining the influence of the affective meanings of music. However, there are many levels of connotations that can be ascribed to majority of music. The scope of denotation of a given piece of music is usually wide. The degree of consensus on denotative and affective meanings of film music was examined in an experiment by Cohen with more realistic and complex materials (1990). In the first part of the study, participants rated the appropriateness of each of the four titles for the four selected,

commercially available music excerpts composed for use in film: *Say Hello To Love*, *Give me Time*, *Alone*, and *Conflict*. Respondents gave mostly unanimous answers which confirmed that such music brings denotative meanings to mind quite consistently. Lipscomb and Kendall (1994), in one of the first studies to use sequences from original feature films – *Star Trek IV: The Voyage Home* (1986), further confirmed that listener-viewers could judge which of several possible music excerpts best fit selected scenes from the movie. Subjects' choices were very consistent and coincided with that of the composer, Leonard Rosenman.

In the second part of the Cohen's study (1990), two of the musical excerpts (*Conflict*, *Say Hello to Love*) were paired with two contrasting short film clips, showing a man chasing a woman and two men fist fighting. These were then judged for title appropriateness and rated on the semantic differential scale. In this case, the results were not that clear. In many instances, the meaning of the individual components matched the judgments of the combined materials. On the one hand, the affective and denotative meaning of the clip of a woman running from a man was significantly influenced by the *Conflict* excerpt, leading to the notion that the two persons are fighting, and it was also impacted by the *Say Hello to Love* excerpt, which suggested that they are playing. On the other hand, the meaning of the clip of fighting men seemed not to be influenced by the music at all. These findings led to the hypothesis that direct influence of music on film meaning depends on the ambiguity of audiovisual material.

The level of ambiguity

This assumption was validated by an experiment using film excerpts of interactions between a pair of wolves, movements of which could systematically communicate complex social information, and thus be seen as more friendly or aggressive (Bolivar, Cohen & Fentress, 1994). The music selections consisted of commercially used excerpts for broadcasts, such as stings, links, promos, and jingles. The aim was to examine the ability to judge semantic and temporal congruence of audiovisual materials and predict the shift of meaning of different combinations of materials. The results confirmed systematic interactions between visual and auditory channels in the evaluation of ambiguous visual materials. The level of aggressiveness and friendliness of music influenced the judgements of the same characteristics in the wolves' social interactions. Thus, music was found to have a direct impact on the character of the ambiguous situation.

A study by Bullerjahn and Güldenring (1994), one of the first to employ qualitative content analysis, may be taken as further evidence for this hypothesis. A 10-minute ambiguous film titled 'Joker' was produced specifically for the experiment and paired with five different soundtracks composed by three different composers: two crime versions, one thriller, melodramatic and undefined version. In addition, to collect personal information, check media competence and musical experience, the questionnaire contained closed-category questions and three open-ended questions about the film. The study showed that different

soundtracks polarise the perception of an ambiguous film presentation and lead to different choice of genre, reasons for the actions of the protagonist, and expectations about the future events.

Following a similar path, Vitouch (2001) investigated musical context effects on perceivers' plot-related expectations. Participants were presented an opening sequence of Billy Wilder's drama *The Lost Weekend* (1945), either with the original score by Miklós Rózsa or fake score in the form of Samuel Barber's *Adagio for Strings*, Op. 11. They were asked to write brief continuations of the plot, which were subsequently analyzed with the focus on emotional content. As hypothesized, different musical settings elicited systematically different anticipations about the future events. The results were considered by the author in terms of context determination effect or musical Kuleshov effect: the same sequence, presented in the context of a different score, may evoke different impressions and expectations.

Does the timing make a difference?

Those studies have all examined the influence of music on visual information presented simultaneously. However, similar effects occur when music precedes or follows events depicted on the screen. Boltz, Schulkind, and Kantra (1991) used 25 excerpts from four feature-length movies and several 30-min television programs: *Alfred Hitchcock Presents*, *The Hitchhiker*, and *Short Stories*. About half of the clips were predicted to resolve in a happy ending, and the rest to end in a negative way. They were combined with a series of 47 simple melodies performed by solo instruments, derived from the same television programmes. The study showed that music influences the meaning and memory of the short film scenes depending on whether it foreshadows or accompanies the visually depicted event and whether its mood is consistent or inconsistent with the character of the scene. For example, music accompanying an episode's outcome led to higher recall when the mood of the music and scene were congruent with one another, and the overall performance was significantly higher with scenes resolving to a positive outcome.

In a further study, Boltz (2001) presented participants with three ambiguous film clips from Alfred Hitchcock's *Vertigo* (1958), Paul Schrader's *Cat People* (1982) and a television show *The Hitchhiker* (1984) accompanied by either positive, negative or no music at all. They were asked to envision the film's ending, evaluate the personality and motivations of the main characters, and judge the film's action on bipolar adjective ratings – immediately after watching an excerpt or a week after the screening to check their memory. Boltz found that the general pattern of the viewers' responses was congruent with the mood of accompanying music, which significantly biased their interpretation and subsequent remembering of a film. She implied that musical soundtrack can activate what psychologists call a *schema*, which is a cognitive framework that helps organize and interpret information in a certain way. The schema evoked by music can also guide our expectations and predictions about the subsequent events and

can ultimately affect our memory of what we saw. Moreover, music may not even have to be present at the same time as a character appears in a scene to influence the way we perceive him or her.

These assumptions were confirmed by Tan, Spackman and Bezdek (2007). They argued that music expressing particular emotions (happiness, sadness, fear, or anger), presented either before or after the appearance of a character within a neutral film scene, can influence viewers' interpretations of the character's emotions. They proved their point based on the excerpts taken from Woody Allen's *Interiors* (1978), Jean-Jacques Beineix's *Diva* (1981), François Ozon's *Swimming Pool* (2003), Krzysztof Kieślowski's *Three Colors: Red* (1994), and *Three Colors: Blue* (1993). Environmental noise and sound effects were preserved whenever possible, and the scenes were combined with four different fragments of music: *Alone* by Morricone from *The Mission* soundtrack (fear), *Coppelia* by Delibes (happiness), *Adagio in G Minor* by Albinoni (sadness), and *The Hunters* from Prokofiev's Peter and the Wolf (anger). The emotion expressed in the music directly influenced the participants' interpretation of the characters' emotion, wheather it preceded or followed their appearance.

Diegetic vs non-diegetic

All of the presented studies used the method of switching the music tracks accompanying a given visual excerpts to see differences in viewers' responses. Tan, Spackman, and Wakefield (2017) examined the question whether making changes to the same piece of music would make a significant difference in perceived meaning of the audiovisual whole. These changes included using the same piece of music in diegetic and non-diegetic role. The researchers used a sequence from Steven Spielberg's *Minority Report* (2002) which takes place in a shopping mall. They prepared a non-diegetic version of an orchestral rendition of Henry Mancini's *Moon River*, originally used in a scene as background music coming from the loudspeakers inside the mall, and mixed it with the scene, while preserving the dialogue and sound effects. It occurred that these two slightly different clips led to dramatically different interpretations of the scene and the relation between main characters. Statistical analysis showed that the participants' ratings of every single item were significantly different for the original and altered version. This study suggested a new research path to explore meanings of film music based on the effects of modifications to the musical score originally composed or paired with a particular scene.

Meanings within the Congruence-Association Model (CAM)

The selected experiments described above are just several of many examples that have shown how music contributes to the perception and cognition of a film by transferring different kinds of meanings. To systematize gathered

information and place the conclusions within a cohesive framework, a Congruence-Association Model (CAM), later expanded to the Congruence-Association Model with Working Narrative (CAM-WN), was proposed by Annabel J. Cohen. A first draft of the model appeared already in 1988, with the experiment presenting the short animation by Heider and Simmel (1944). Within the next three decades the author was developing and adjusting her framework according to the increasing knowledge of the cognitive processing of multimedia (Cohen, 2013, 2015). The model was inspired mainly by general theories of cross-modal perception and accumulating body of empirical studies in this field.

The CAM-WN Model assumes that there are two sources of information available to a film spectator: audiovisual information coming from the external world, which collides with individual set of information stored in the long term memory. The first is bottom-up sensory information originating from five channels: text, speech, visual, music, sound effects, and kinesthetic surface. These visual and auditory channels are specialized for the respective type of input modality. The second is top-down cognitive information based on our past experiences, including general knowledge about films and their interpretation. All this information is processed at four levels, starting with unimodal processing at the sensory level, through higher order pre-conscious integrated multimodal processing, to conscious shaping of the audiovisual information.

At the most basic level, physical features of the sensory information from each channel are processed. This input is analyzed for both structure and meaning which lead to the cross-modal connections between different sensory modalities at the next level. Evaluation of the degree of structural congruence is based on Gestalt laws of grouping stimuli into patterns and relating these patterns to one another. The structural congruence induces prioritization of some modalities over others, usually giving primary attention to visual modality. If such congruence occurs between music and visual surface, priority is given to this information while transferring it to the short-term memory. Moreover, the meaning of this element is analyzed as a result of all the associations generated by music and visual information. Similarly, analysis of meaning within every channel leads to activation of different cross-modal associations. Due to the limited attention capacity and primacy of processing visual aspect, only selected information is further processed.

At the level called 'working narrative' film spectators attempt to make sense of the film as a whole by continually building a narrative out of visual and auditory elements. The confrontation of the bottom-up and top-down information generates hypotheses, expectations and inferences about the story. The 'working narrative' represents the outcome of the best match between the dynamically changing sensory information and our knowledge about the story grammar based on previous experience. Music contributes to this process by directing the path of perception and attention, thus influencing both comprehension of the story and memory of the events. As stressed by Cohen (2015), the CAM-WN model might be applied while planning new experiments on multimedia perception and stimulate interdisciplinary collaborations between scholars with different specialisations, leading to further development of the concept.

New Research Perspectives

Growing body of empirical research investigating the cognition of film music contributes to better understanding of its meanings. Many early studies centred on the assessment of the affective and referential meanings of music within the audiovisual context, relying on participants' ratings and answers given after watching a particular film clip (Cohen, 1994). Discussing a film's single components and their interrelations was a key to understanding the meaning of a whole. Effects of film music were seen as resulting from a combination of properties of music and visual images and its relation to other film elements. Soon music started to be treated as one dimension of a holistic experience in which meaning emerges from dynamic interactions among multiple media. With its reliance on controlled experiments, cognitive psychologists devoted to film music studies proved that film music accomplishes much more than simply mirroring the events, or intensifying the emotional tone of the film. The studies showed that music is powerful enough to shape our perception and cognition of the narrative elements, even when it is not in the spotlight of our conscious attention (Tan, 2017).

Nowadays, easy access to media and new technologies facilitates the advancement in empirical research, and thus stimulates progress in the field of psychology of film music and the role of music in multimedia. New research possibilities, such as the use of dials or sliders to gather continuous responses while watching a film, brain imaging technology, embedded cues, or eye-tracking devices, allow one to observe real-time changes in the process of perception and provide more compelling and nuanced discoveries (Tan, 2016). Moreover, research in different domains of human psychology, like social- or neuro-psychology, significantly contributes to understanding of the phenomenon from the cognitive perspective.

Recent developments in studies of music as inherently multimodal, as opposed to a strictly auditory experience, might lead to the major paradigm shift. The authors of the introduction to the special issue of *Psychology: Music, Mind, and Brain* devoted to *Music as a Multimodal Experience* argued that listening to music involves multiple sense-modalities (including visual aspects), activated through cross-modal correspondences or cross-modal associations (Timmers & Granot, 2016). These modalities might influence how we perceive music and engage with it, and thus how we formulate its meanings. It is apparent that there are still many creative possibilities and ideas to be tested and turned into more general principles. These new findings might contribute to a better understanding of diverse meanings of music, also those emerging from its presence in film.

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